

REMARKS

The abstract and specification have been amended in order to correct grammatical and idiomatic errors contained therein. No new matter has been added.

The claims have been amended in order to address the Examiner's objections and to more particularly point out and distinctly claim the subject matter which Applicants regard as the invention. No new matter has been added.

Claims 1-4 have been rejected under 35 USC 103(a) as being unpatentable over JP '479 in view of KR '067. Claims 1-4 also have been rejected on the ground of nonstatutory obviousness-type double patenting over Claims 1-14 over Imori in view of JP '479. Claims 1-4 also have been rejected on the ground of nonstatutory obviousness-type double patenting over Claims 1-11 of Imori et al '461 in view of JP '479. Claims 1-4 also have been rejected on the grounds of nonstatutory obviousness-type double patenting over Claims 1-14 of Imori et al '741 in view of JP '479. Claims 1-4 also have been rejected on the ground of nonstatutory obviousness-type double patenting over Claims 1-6 of application Serial No. 10/558 172 in view of JP '479. Claims 1-4 also have been provisionally rejected on the ground of nonstatutory obviousness-type double patenting over Claims 1-10 of application Serial No. 10/586 379 in view of JP '479. Claims 1-4 also have been rejected on the ground of nonstatutory obviousness-type double patenting over Claims 1-11 of application Serial No. 11/795 355 in view of JP '479. Claims 1-4 also have been provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over Claims 5 and 6 of application Serial No. 10/576 230 in view of JP '479. Claims 1-4 also have been provisionally rejected on the ground of nonstatutory obviousness-type double patenting over Claims 1-3 of application Serial No. 11/662 046 in view of JP '479 and KR '067. Applicants respectfully traverse

these grounds of rejection and urge reconsideration in light of the following comments.

The presently claimed invention is directed to an ink composition used in an inkjet process for drawing a wiring pattern on a substrate in which the improvement comprises the ink composition contains from 0.01 to 100 g/L of an azole-based silane coupling agent as a coupling agent for an electroless plating activator.

In today's technology, a variety of methods have been developed for drawing a wiring pattern on a substrate using an inkjet process. For example, it is known to use a silane coupling agent to improve the adhesion of an electroless metal pattern to the substrate. In this process, a pattern is drawn on a substrate with an inkjet printer using a silane coupling agent and then the pattern is immersed in an activation solution to make the activator adhere to the drawn pattern, after which the pattern is electrolessly plated with nickel. Amino-based coupling agents are known to be particularly suitable in this process. However, when an amino-based silane coupling agent is used, the subsequent adhesion of the activator thereto is not uniform and the adhesive strength is inadequate so that the underlying surface has to be pretreated by a process such as etching.

The present invention has been arrived at in order to provide an inkjet ink composition which can uniformly form a wiring pattern having an excellent adhesion on a substrate. That is, the present invention was arrived at by the discovery of the present inventors that an ink composition containing an azole-based silane coupling agent as a coupling agent for an electroless plating activator is unexpectedly effective in capturing the activator and adhering to the substrate when applied by inkjet printing. It is respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

JP '479 discloses a method of drawing a wiring pattern on a substrate by an inkjet process in which a composition

containing a silane coupling agent is applied to the substrate in a pattern. As admitted by the Examiner, this reference does not disclose an azole-based silane coupling agent and the subsequent performance of electroless plating of the metal on the substrate. As such, the secondary reference, KR '067, has been cited to cure these deficiencies. It is respectfully submitted that the secondary reference does not cure the deficiencies of the primary JP '479 reference.

KR '067 discloses an electroless metal plating method in which a silane-based coupling agent, which can be dissolved in a suitable solvent, is applied to a substrate, treated with a noble metal solution and then electrolessly plated. As the silane-based coupling agent, a silane coupling agent obtained by the reaction of an azole with an epoxy silane compound is disclosed. However, there is no disclosure in this reference of the silane coupling agent being contained in an ink composition which is applied to the substrate by inkjet printing. In order for an ink composition to be suitable for inkjet printing, it must be suitable for discharge from an inkjet nozzle and fixing on a substrate. Therefore, it is required to have specific characteristics with respect to viscosity, surface tension and adherence to the substrate. There is no suggestion in KR '067 that the azole-based silane coupling agent disclosed there would be suitable as an ink composition in the primary reference with a reasonable expectation of success because there is no teaching that a mixture of an azole-based silane coupling agent and another composition could function as an ink composition in inkjet printing.

Another difference between the present invention and the primary reference is that the silane coupling agent in the primary reference has to be heated and dried whereas in the present invention, a heating process is not necessary. This results in an unexpected reduction of the number of production steps and further establishes the difference from the presently claimed invention from the primary JP '479

reference. As such, the combination of JP '479 and KR '067 does not teach that a mixture of an azole-based silane coupling agent and another composition can function as an ink composition for inkjet printing. As such, it is respectfully submitted that the presently claimed invention is patentably distinguishable over the combination of these two references.

In order to further establish the unobviousness of the presently claimed invention, test data is contained in the present application which is more than sufficient to rebut a showing of prima facie obviousness under 35 USC 103(a). In the Comparative Example contained in paragraph [0020] in the present specification, γ -aminopropyltrimethoxysilane was used in place of the reaction product of imidazole and γ -glycidoxypentyltrimethoxysilane. The γ -aminopropyltrimethoxysilane used in the Comparative Example corresponds very closely to the γ -aminopropyltriethoxysilane used in JP '479. The peel strength of the plating film obtained from using the ink composition of the Comparative Example was 1/5 of that of the ink compositions of Examples 1 and 2 of the present invention. A five-fold increase in peel strength of the claimed invention over the closest prior art is clearly unexpected and further establishes the patentability of the presently claimed invention.

With respect to the numerous obviousness-type double patenting rejections made by the Examiner, the claims of the Imori patent only disclose a method of forming a metal plating on an article using a silane coupling agent. The claims of Imori et al '461 disclose a metal plating method and pretreatment agent comprising a silane coupling agent obtained by reacting an imidazole-based compound and an epoxy silane-based compound. The claims of Imori '741 disclose an electroless metal plating method which utilizes a solution of a silane coupling agent which has an azole group. The claims of application Serial No. 10/558 172 disclose an electroless plating method which utilizes a silane coupling agent obtained by reacting an azole compound with an epoxy silane compound.

The claims of application Serial No. 10/586 379 disclose a pretreating agent which can comprise a silane coupling agent obtained by reacting an azole compound or amine compound with an epoxy silane compound. The claims of application Serial No. 11/795 355 disclose a resin substrate material having a surface that is swellable in a solution containing an imidazole silane and a noble metal compound. The claims of application Serial No. 10/576 230 are directed to an electroless copper plating method which can use a pretreatment agent prepared by reacting a noble metal compound and a silane coupling agent having a functional group with metal capturing capability. The claims of application Serial No. 11/662 046 disclose an electroless plating pretreatment agent comprising a thermoset resin and a silane coupling agent having a metal-capturing capability. None of these references disclose that an azole-based silane coupling agent can be used in an ink composition which is applied to a substrate by inkjet printing. Therefore, these references are no more relevant than KR '067 with respect to the disclosure of the presently claimed invention.

As pointed out previously, JP '479 only discloses a silane coupling agent used in an inkjet process but, as shown by the comparative test data contained in the present specification, the azole-based silane coupling agent of the present invention provides an unexpectedly superior peel strength to the ink composition as compared to the silane coupling agent disclosed in JP '479. As such, assuming for arguments sake that any of the references combined with JP '479 presents a showing of prima facie obviousness under 35 USC 103(a), the objective evidence of unobviousness present in the instant specification is more than sufficient to rebut any rejection made under 35 USC 103(a) of the presently claimed invention.

The Examiner is respectfully requested to reconsider the present application and to pass it to issue.

Respectfully submitted,


Terryence F. Chapman

TFC/smd

FLYNN, THIEL, BOUTELL	David G. Boutell	Reg. No. 25 072
& TANIS, P.C.	Terryence F. Chapman	Reg. No. 32 549
2026 Rambling Road	Mark L. Maki	Reg. No. 36 589
Kalamazoo, MI 49008-1631	Liane L. Churney	Reg. No. 40 694
Phone: (269) 381-1156	Brian R. Tumm	Reg. No. 36 328
Fax: (269) 381-5465	Heon Jekal	Reg. No. 64 219
	Eugene J. Rath III	Reg. No. 42 094
	Dale H. Thiel	Reg. No. 24 323
	Sidney B. Williams, Jr.	Reg. No. 24 949

Encl: Replacement Abstract
Clean Substitute Specification
Marked-Up Substitute Specification
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